Kentucky Academic Course Code List

Engineering and Technology Courses without Certification

Kentucky Academic Course Codes
The Kentucky Department of Education (KDE) initiated a course code project under the direction of Commissioner Pruitt in January 2017. The project ensures Kentucky is providing equitable opportunity and access to research-based student experiences that impact student success.

The results of the project include an alignment of core academic course codes to Kentucky Academic Standards. The standards aligned to the core academic course codes cannot be changed. The alignment serves as a guarantee to students across the Commonwealth that all students have equitable access to Kentucky Academic Standards. The project also provides an alignment to Kentucky's new Accountability System, 703 KAR 5:270, which measures opportunity and access provided to students across Kentucky.

The Kentucky Academic Course Code List contains a listing of course codes and descriptions along with certifications that fit the parameters for given courses. The content listed for a course cannot be changed; however, the grade range and population information listed for each course are not absolute and can vary slightly depending on the needs of the school and teacher certifications. Districts should choose the course that most closely represents the content in a given course. ***The description and content of a course are the determining factors in what should be selected.***

Contact Information:

- Districts may contact CourseCodes@education.ky.gov with questions pertaining to course codes, course content and course-standards alignment.
- Districts may contact the EPSB Division of Certification at (502) 564-4606 or dcert@ky.gov with question pertaining to certification.
- Districts may contact KHEAA at (502) 696-7397 or kees@kheaa.com with questions pertaining to KEES eligibility.

HOW TO USE THIS DOCUMENT
This document contains a listing of course codes and descriptions along with certifications that fit the parameters for given courses. The grade range listed for each course are not absolute. Please choose the course that most closely represents the content in a given course.

> EXAMPLE
> John Q Middle School had 5th, 6th, and 7th grade students taking a Visual Art course. This course would be linked to course number **500711: Visual Art – Comprehensive**, which shows a recommended grade range of 6 – 12.

Schools will link their courses on the Infinite Campus "Course Master" tab OR in the "Course" tab to courses listed in this document.

Schools may have created courses that are very unique in order to meet students' needs. If a course does not meet the definition or content of one contained in this document, please use course number **909999: School Defined Course**, and define the correct content through the LEAD report.

The course code 909999 should be used in situations where a current course code does not exist and there are no existing Kentucky Academic Standards aligned to the course. Local Boards of Education should approve the use of a district's use of a 909999 course code *before* a district begins utilizing it within Infinite Campus. Please see the Guiding Principles For Using Course Code 909999 for more information.

CERTIFICATIONS

It is important to note that the certificates listed are the ones that fit ***ALL*** of the parameters for a specific course; there may be other certificates that can teach it with slightly more restrictive parameters.

Please take note of the following information from ***The Kentucky Academic Standards*** with regard to middle school courses that are offered for high school credit.

> **High School Credit Earned in Middle School**
> It is expected that most students will earn high school credits during their high school years. However, local school districts may offer high school courses to middle level students if the following criteria are met:
>
> - the content and the rigor of the course are the same as established in the *Kentucky Academic Standards*
> - the students demonstrate mastery of the middle level content as specified in the *Kentucky Academic Standards*
> - the district has criteria in place to make reasonable determination that the middle level student is capable of success in the high school course
> - **the middle level course is taught by teachers with either secondary or middle level certification with appropriate content specialization**

Although middle level courses list the Provisional and Standard Elementary Certificates, Grades 1-8 as allowable under the parameters of these courses, they will not meet the above requirements for courses that are offered for high school credit.

This document is a guide; therefore the EPSB disclaims any warranties as to the validity of the information in this document. Users of this document are responsible for verifying information received through cross-referencing the official record in the EPSB's Division of Certification. The EPSB shall not be liable to the recipient, or to any third party using this document or information obtained therefrom, for any damages whatsoever arising out of the use of this document.

Engineering and Technology Program Area
(210000)

The Engineering and Technology program is a study of technology, innovation, design, and engineering, which provides an opportunity for students to learn about the processes and knowledge related to technology that are needed to solve problems and extended human capabilities.

Engineering and Technology - Engineering Technology (210100)

Career Major: Technology courses derive content from the study of technology, innovation, design, and engineering, which provides an opportunity for students to learn about the processes and knowledge related to technology that are needed to solve problems and extend human capabilities. Any course not found under this career major/sub code may be found in another career major/sub code within this program area.

210101 - Invention and Innovation

Grade Level: 6 - 8
Credits: n/a
Description: This course provides students with opportunities to apply the design process in the invention or innovation of a new product, process, or system, In this course, students will learn all about invention and innovation. They will have opportunities to study the history of Invention and Innovations, including their impacts on society. They will learn about the core concepts of technology, and about the various approaches to solving problem, including engineering design and experimentation. Finally students learn about how various Invention and Innovations impact their lives. Students participate in engineering-design activities to understand how criteria, constraints, and processes affect designs. Students are involved in activities where they learn about brainstorming, visualizing, modeling, constructing, testing, experimenting, and refining designs. Students also develop skills in researching for information, communicating design information, and reporting results. This course will make extensive use of a laboratory environment through a variety of instructional strategies. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210103 - Technological Systems

Grade Level: 6 - 8
Credits: n/a
Description: This course is intended to teach students how technological systems work together to solve problems and capture opportunities. A system can be as small as two components working together (technical system/device level) or can contain millions of interacting devices (use system/network level). We often break down the macro-systems into less complicated micro-systems in order to understand the entire system better. However, technology is becoming more integrated, and systems are becoming more and more dependent upon each other than ever before. Electronic systems are interacting with natural (i.e., biological) systems as humans use more and more monitoring devices for medical reasons. Electrical systems are interacting with mechanical and fluid-power systems as manufacturing establishments become more and more automated. This course will give students general background on the different types of systems but will concentrate more on the connections between these systems. The goals of this course can be accomplished in a laboratory environment through a variety of instructional strategies. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210105 - Special Technology Topics

Grade Level: 6 - 8
Credits: n/a
Description: Special Technology Topics allows the teacher to develop a course for in-depth exploration of technological topics. This course will allow students to gain a more comprehensive knowledge of a particular technology topic or explore specialized technology careers. This can be accomplished in a laboratory environment through a variety of instructional strategies. The structure of this course is determined at the local level to address individual situations. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210107 - Foundations of Engineering Technology

Grade Level: 9 - 12
Credits: 1
Description: This course provides the foundation for students to understand and apply technological concepts and processes that are the cornerstone for the high school technology program. Group and individual activities engage students in creating ideas, developing innovations, and engineering practical solutions. The course will employ teaching/learning strategies that enable students to build their understanding of new ideas. It is designed to engage students in exploring and deepening their understanding of big ideas regarding technology. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210108 - Technological Design

Grade Level: 9 - 12
Credits: 1
Description: This course contributes to the development of each high school student's capability to understand how technology's development, control, and use are based on design constraints and human wants and needs. The structure of the course challenges students to use technological design processes so that they can think, plan, design, and create solutions to engineering and technological problems. Students are actively involved in the organized and integrated application of technological resources, engineering concepts, and scientific procedures. Students address the complexities of technology that stem from designing, developing, using, and assessing technological systems. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210110 - Engineering and Engineering Technology Design (Capstone)

Grade Level: 11 - 12
Credits: 1
Description: Engineering scope, content, and professional practices are presented through practical applications in this capstone course. Students in engineering teams apply technology, Kentucky Academic Standards, and skills to solve engineering design problems and create innovative designs. Students research, develop, test and analyze engineering designs using criteria such as design effectiveness, public safety, human factors and ethics. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210112 - Special Topics, Engineering Technology

Grade Level: 11 - 12
Credits: 1-4
Description: The course allows the teacher to develop a course for in-depth exploration of technological topics. This is a laboratory-based course designed to study a technological system or topic, and/or a recent technological advancement. This study should include how this advancement affects society and/or the environment. A culminating project integrating one or more of the seven contexts of technological literacy is encouraged. It should include research, design, construction, analysis, writing, and presenting. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210117 - Advanced Design Applications

Grade Level: 11 - 12
Credits: 1
Description: This course is a continuation into the broad perspective of the science, engineering and technology. It focuses on understanding concepts and skills of engineering and technology. Students will learn the importance of the application of critical thinking and problem solving skills in pursuing an engineering and technology related careers. Students will gain a deeper understanding of these technological areas: Energy and Power, Information and Communication, Transportation, Manufacturing, Construction, Medical, Agriculture, and Bio-Related Technologies. Students engage in individual and group activities creating ideas; developing innovations; and designing, fabricating, and engineering practical solutions to a variety of technological problems. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210118 - Advanced Technological Applications

Grade Level: 11 - 12
Credits: 1
Description: This course includes activities and real world projects with state-of-the-art equipment and trainers. Students explore and study an introduction to engineering, engineering design problem solving, and engineering graphics with a 3D parametric modeling software. Students prototype a part design and prepare the manufacturing process using a 3D printer, CNC Vertical Mill, CNC turning center, a material handling robot and/or plastic molding machine. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210119 - Exploration of Power Energy and Transportation Technology

Grade Level: 6 - 8
Credits: n/a
Description: This course allows for exploration in the many phases of Power Energy and Transportation through hands-on activities. This program of study facilitates STEM principles to be applied in real world situations. This course should include Aviation and Aerospace, Transportation Systems, Power and Energy, and Research. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210120 - Exploration of Manufacturing Technology

Grade Level: 6 - 8
Credits: n/a
Description: An exploratory course designed to investigate the types of activities performed in the manufacturing industry and through laboratory experiences students explore the skills and technologies of this industry. Content includes the application of technology; the design of products and services; emerging and innovative technologies; safety and maintenance of technology; and career explorations. Activities may include computer aided drafting, manufacturing parts, CNC programming, computer control, and robotics. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210121 - Exploration of Construction Technology

Grade Level: 6 - 8
Credits: n/a
Description: An exploratory course designed to investigate the types of activities performed in the construction industry and through laboratory experiences students explore the skills and technologies of this industry. Content includes the application of technology; the design of products and services; emerging and innovative technologies; safety and maintenance of technology; marketing; and technology-related career explorations. Activities may include computer aided design, architectural drafting, building models of buildings, using construction tools, machines, to design and building simple structures. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210122 - Exploration of Computer and Graphic Communication Technology

Grade Level: 6 - 8
Credits:
Description: An exploratory course designed to provide students the skills and knowledge that are performed in the computer and communication industries. The types of activities may include but not limited to developing images, digital photography, desktop publishing, computer aided design, mechanical drafting, and printing, computer animation, sublimation, screen printing, bindery, audio/video production, and file management through laboratory experiences. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210127 - Exploring Technology

Grade Level: 6 - 8
Credits: n/a
Description: Students develop an understanding of the progression and scope of technology through exploratory experiences. In group and individual activities, student experience ways in which technological knowledge and processes contribute to effective design and solutions to technological problems. Students participate in design activities to understand how criteria, constraints, and processes affect designs. Brainstorming, visualizing, modeling, constructing, testing, and refining designs provide first hand opportunities for students to understand the uses and impacts of innovations. Students develop skills in communicating design information and reporting results. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210133 - Graphic Communications

Grade Level: 9 - 12
Credits: 1
Description: This is a fundamental course that offers a cross-disciplinary program designed for students interested in gaining knowledge and skills in various phases of graphic communication technology. This is a project based program with activities in, but not limited to, computer design,

digital imaging, document layout, multimedia, web site development, digital printing, offset printing, screen and sublimation printing processes, bindery, packaging technology. Students apply creative problem solving while learning about technology and management practices related to the production and distribution of graphic media in its many forms. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210135 - Production Technology

Grade Level: 11 - 12
Credits: 1
Description: This course allows students the opportunity to develop a project from "vision to reality by working with teams to design, engineer, manufacture, construct, test, redesign, and produce a finished project. This course can serve as capstone course working with business and industry as part of their design, development, fabrication, and marketing using skills and knowledge from previous manufacturing courses. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210136 - Advanced Technology for Design and Production (SREB)

Grade Level: 9 - 10
Credits: 1
Description: This course engages students in the use of modern technologies in the design and improvement of products. Students use three-dimensional CAD software in the creation and analysis process. Students document designs using standards set by industry for design documentation. Students implement methods of green production and just-in-time component supply, which allow for the lowest cost and highest quality products. Students design and troubleshoot data acquisition, programmable logic control, process monitoring, automation, and robotic systems. Students incorporate sensing and vision systems, utilizing cameras and sensors to control automated systems. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Advanced Manufacturing Technology
Population: General

210137 - Systems of Advanced Technology (SREB)

Grade Level: 10 - 11
Credits: 1
Description: In this course, students apply the technologies that are found in modern clean, production environments. Students study effective and energy efficient control of pumping, conveyors, piping, pneumatic and hydraulic control systems. Students apply total quality management to production design to assure quality. Students also focus on properties of materials and material testing, creating documentation to support designs, examining properties, and justifying material selections based on properties. Students learn that old products become the new raw materials for new products. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Advanced Manufacturing Technology
Population: General

210138 - Mechanical and Technical Design

Grade Level: 9 - 10
Credits: 1
Description: This is considered a basic course that will provide students with instructions in the characteristics and evolution of drafting technology, underlying principles of design and fundamental knowledge and skills in the use mechanical drawing, illustrations, and various forms of mechanical drawings, geometry and applied mathematics that apply to architectural and/or engineering design. Introduction to various forms of computer aided software to gain basic skills and knowledge. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210139 - Introduction to Aircraft Maintenance Technology

Grade Level: 10 - 12
Credits: 1
Description: The purpose of this curriculum is for students to develop basic knowledge and personal skills that can be applied to a broad range of career opportunities with emphases to aviation maintenance technology. Students will gain experience in electricity and electronics, metalworking, woodworking, plastics and composite materials through the use of tools, machines and materials that are basic to aviation industry. It will cover both hand and machine-tool operations, and supplies background knowledge on equipment and processes utilized in aviation industry and manufacturing. The program allows students to learn basic problem solving skills, instruction in mechanical drawing, blue print reading, engineering CAD, and the application of the engineering concepts and mathematics. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Aerospace Engineering
Population: General

210140 - Architectural Design and Civil Engineering

Grade Level: 10 - 12
Credits: 1
Description: This course is for students who wish to broaden their basic skills in the field of residential architectural drafting and surveying. Covers procedures used in developing complete set of residential plans, history of surveying, mathematics, measurement and computations, and the proper use of basic drafting and surveying instruments, equipment and software. Students will develop projects in accordance to drafting and building code requirements. Projects will emphasize the importance of communication and organization as they participate in the roles of civil engineers, architects, land developers, surveyors, and/or general contractors in residential planning and construction. Participation in Kentucky Technology Student Association will greatly enhance instruction. Prerequisite: 210223 Fundamentals of Architectural and Civil Engineering.
Content: Engineering and Technology
Population: General

210141 - Fundamentals of Building Construction Technologies

Grade Level: 11 - 12
Credits: 1
Description: Students explore architectural design foundations and increase understanding of working drawings, construction techniques, and codes regulating building design. They learn the design process and apply the elements and principles of design to architectural projects. Through producing models and illustrations of all aspects of a building, students create architectural design solutions using CAD (computer aided design). Students design and build scale or full-size structures and work with projects that help them understand the jobs of architects, carpenters, electricians, plumbers, surveyors, contractors, masons, design engineers, and a variety of other construction careers. They also explore aspects of the construction industry. Participation in Kentucky Technology Student Association will greatly enhance instruction. Prerequisites: 210223 Fundamentals of Architectural and Civil Engineering and 210140 Architectural Design and Civil Engineering.
Content: Engineering and Technology
Population: General

210142 - Power and Energy Equipment Technology

Grade Level: 9 - 12
Credits: 1
Description: Power and Energy Equipment is used every day in many different ways. To become a more environmentally friendly society, students will have a basic understanding of the various types of energy equipment and how energy is obtained or generated. Everyone should know what energy sources are available that do not pollute the environment and how this energy can be converted into a useful power supply. This course provides students with the foundation in content and skills associated with various energy sources, and electrical power generation, working with AC/DC electrical circuits, and transfer of various energy forms to produce DC current. Laboratory-based activities are an integral part of the course that includes safe use and application of appropriate technology, scientific testing and observation equipment. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

210143 - Mechatronic Systems for Advanced Production (SREB)

Grade Level: 11 - 12
Credits: 1
Description: Students will design cost-effective work cells incorporating automation and robotics to improve quality of final products. The advanced production in this course depends on the use and coordination of information, automation, network systems, vision and sensing systems. Students will design and create mechatronic systems and automated tooling to accomplish these advanced tasks. Students produce authentic documentation about their cyber-mechanical systems and the integration with data to control and monitor processes. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering and Technology
Population: General

Engineering and Technology - Engineering
(210200)

Career Major: Engineering is a four year sequence of courses which, when combined with traditional mathematics and science courses in high school, introduces students to the scope, rigor and discipline of engineering. Any course not found under this career major/sub code may be found in another career major/sub code with in this program area.

210221 - Fundamentals of Engineering Design

Grade Level: 9 - 12
Credits: 1
Description: This course applies the skills, concepts, and principles of engineering. Students explore various technological systems and engineering processes in related career fields. Topics include investigating technological system, design optimization, and problem solving. Students utilize CAD and physical and virtual modeling concepts to construct, test, collect, and report data. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210222 - Engineering Design

Grade Level: 10 - 12
Credits: 1
Description: A project and research based course that extends the learning experiences where students focus on mechanical, electrical, fluid and thermal systems allowing in depth exploration in selected disciplines of engineering areas such as manufacturing, power/energy/transportation, bio-medical, robotics, hydraulics, electricity/electronics, communications, construction systems, alternative energy, computer aided design and problem solving. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210223 - Fundamentals of Architectural and Civil Engineering

Grade Level: 9 - 12
Credits: 1
Description: This is an introduction to residential and light commercial building construction and design. Students will learn basic sketching, mechanical drafting skills with an emphasis on computer aided drafting. In this class, students will design a structure relevant to today's modern architecture and create models of their designs with various materials and tools. Students will experience and solve many problems in designing or building structures with regards to environment and community impact and limitations from town planning, urban design and landscape architecture to furniture and objects. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210224 - Principles of Engineering Technology

Grade Level: 9 - 10
Credits: 1
Description: This course provides a project based learning approach to understanding the principles and concepts of physics and associated mathematics for most Engineering Technology programs. Students explore various careers and disciplines of engineering areas, problem solving and core technology such as, but not limited to; manufacturing, power/energy/transportation, robotics, hydraulics, electricity/electronics, communications, construction systems, alternative energy and computer aided design. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210225 - Introduction to Manufacturing and Manufacturing Systems

Grade Level: 9 - 12
Credits: 1
Description: This is a comprehensive course designed for the study of general concepts and principles of manufacturing and manufacturing systems. This course provides for hands-on learning experience which enhances the understanding of various metallic/nonmetallic materials, processes, and products. Materials studied may include polymers, ceramics, woods, composites, and metal materials associated with manufacturing Students have the opportunity to engage in product design, prototyping, computer-assisted manufacturing applications, CNC machines, robotics, and production management. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210226 - Introduction to Aerospace

Grade Level: 9 - 10
Credits: 1
Description: The course covers the exploration of aerospace including, flight/aeronautics, aircraft maintenance, aeronautical engineering, and space. Students will learn about the forces that affect

controlled flight, investigate properties of lift, and explore flight through a flight simulator. Students will also learn about aerospace standard materials, aviation safety, aircraft and wing design, and elements of a space mission resource system. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Aerospace Engineering
Population: General

210229 - Fundamentals of Aerospace Engineering

Grade Level: 10 - 12
Credits: 1
Description: The fundamental concepts and approaches of aerospace engineering are highlighted through lectures on aeronautics, astronautics, and design. Project based course where students will design, build and test projects such as lighter-than-air (LTA) vehicle or various wing designs. The connections between theory and practice are realized in the design exercises. Required design reviews precede the LTA race competition. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Aerospace Engineering
Population: General

210230 - Fundamentals of Mechatronics

Grade Level: 11 - 12
Credits: 1
Description: Electro-Mechanical Systems courses provide students with instruction and experience with mechanical devices, actuators, sensors, electronics, intelligent controllers and computers. Students gain an understanding of the principles of electricity and mechanics and their application to gears, including hydraulic/pneumatic equipment, cams, levers, circuits, and other devices used in the manufacturing process or within manufactured goods. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210232 - Electricity and Electronics

Grade Level: 9 - 12
Credits: 1
Description: In this course students will gain skills and knowledge through classroom and lab activities in the areas of basic DC and AC circuits, circuit components, codes, testing, electromagnetism and inductance, capacitance, power supplies, power generation and distribution, amplification, digital circuits, and computer fundamentals. Students will develop a basic understanding of the various types of energy and how energy is obtained. Students will learn the safe use of the tools, test instruments, equipment and supplies used in this course plus information on career opportunities in this field. Hands-on and problem solving activities will expose students to areas of electron theory, Ohm’s Law, insulators, conductors, electronic components, oscillators, and electronic fabrication. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210233 - Fundamentals of Aviation Science

Grade Level: 9 - 12
Credits: 1
Description: The course covers the fundamentals of aerospace including, the development of the balloon, lighter than air vehicles, gliders, rockets, and heavier than air flight vehicles. Introduces students to the basic science of aerodynamics: including the development of aircraft from the Wright Brothers to the present day while exposing students to the various career opportunities in aviation. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Aerospace Engineering
Population: General

210234 - Aviation Science

Grade Level: 10 - 12
Credits: 1
Description: This course prepares students for flight training and aircraft operations. Students will gain knowledge and skills in airport systems, air traffic control procedures, aviation weather, air navigation, radio communication procedures, and Federal Aviation Regulations (FAR's). This course covers the history of aviation law, federal regulation of air transportation and the role of state and federal government in aviation law including functions of the Federal Aviation Administration. Students will become familiar with aircraft power plants, principles of flight, aircraft systems/instruments, and science of weather. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Aerospace Engineering
Population: General

210235 - Introduction to Space Systems Engineering

Grade Level: 10 - 12
Credits: 1
Description: The course introduces students to satellites and space systems: orbital mechanics; the space environment; satellite application; spacecraft design consideration; the roles universities, industry and government play in space exploration, and future technologies of spacecrafts and satellites. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Aerospace Engineering
Population: General

210236 - Space Systems Engineering

Grade Level: 10 - 12
Credits: 1-3
Description: An instructional program in astronautics designed to develop basic knowledge of space systems and to gain practical experience in designing, fabricating, and testing space type experiments. Students will learn and understand the constraints on device design to operate in the LEO (Low Earth Orbit) space environment. Students will also get hands-on experience in a laboratory environment and in the safe use of shop equipment. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Aerospace Engineering
Population: General

210237 - Commercial Aviation Science

Grade Level: 11 - 12
Credits: 1
Description: This course discusses the Federal Aviation Regulations covering the privileges, limitations, and operations of a commercial pilot, and the operations for which an air taxi/commercial operator, agricultural aircraft operator, and external load operator certificate, waiver, or exemption is required. The course also discusses the safe and efficient operation of airplanes, including inspection and certification requirements, operating limitations, high altitude operations and physiological considerations, loading computations, the significance of the use of airplane performance speeds, the computations involved in runway and obstacle clearance and cross wind component considerations, and cruise control. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Aerospace Engineering
Population: General

210238 - Foundations of Robotics

Grade Level: 9 - 10
Credits: 1
Description: This course provides students with the foundation in content and skills associated with robotics and automation, including artificial intelligence, electronics, physics, and principles of engineering. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210239 - Robotics Design Essentials and Systems

Grade Level: 9 - 12
Credits: 1
Description: This course provides students with content and skills essential to the design and operation of robotic systems. Students activities will include artificial intelligence specialized sensors, electronic applications, engineering technologies, environmental physics, manufacturing, topographical considerations, programming, motions physics, electric motors, communications, simulations, simulation and modeling, and critical thinking skills. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210240 - Robotic Application Capstone

Grade Level: 11 - 12
Credits: 1
Description: This course provides students with skills essential to the design and operation of autonomous robotic systems in the context of a capstone project. Students will design and build an autonomous robot to perform pre-designed tasks. Participation in Kentucky Technology Student Association will greatly enhance instruction. Prerequisites: 210238 Foundations of Robotics and 210239 Robotics Design Essentials and Systems.
Content: Engineering
Population: General

210242 - Introduction to Alternative Energy

Grade Level: 10 - 11
Credits: 1
Description: This course provides students with the foundation in content and skills associated with various energy sources, and electrical power generation, transmission, and distribution. Students will develop competencies in the area of energy history and the global impact of renewable and non-renewable resources; career opportunities; environmental principles, working with AC/DC electrical circuits, and transfer of various energy forms to produce DC current. Laboratory-based activities are an integral part of the course that includes safe use and application of appropriate technology, scientific testing and observation equipment. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210243 - Alternative Energy

Grade Level: 10 - 12
Credits: 1
Description: This course provides students with the foundation in content and skills associated with various energy sources, and electrical power generation, transmission, and distribution. Students will develop competencies in the area of energy history and the global impact of renewable and non-renewable resources; career opportunities; environmental principles, working with AC/DC electrical circuits, and transfer of various energy forms to produce DC current. Participation in Kentucky Technology Student Association will greatly enhance instruction. Prerequisite: 210242 Introduction to Alternative Energy.
Content: Engineering
Population: General

210244 - Global Energy Issues

Grade Level: 10 - 12
Credits: 1
Description: The course critically examines issues associated with the technical, economic, societal, environmental, and geopolitical aspects of energy and sustainability. Students will develop competencies in the area of energy history and the global impact of renewable and non-renewable resources; career opportunities; environmental principles. The course is taught through lectures, discussions, hands on activities, field trips and invited speakers. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210245 - Energy I: Energy Industry Basics

Grade Level: 9 - 12
Credits: 1
Description: Investigates competencies required for employment by various industries that manufacture energy sources. Addresses the competencies identified by the Center for Energy Workforce Development (CEWD) organization that are needed for energy industries. Combined with Energy II and Energy III qualifies students to take the CEWD Energy Industry Fundamentals (EIF) certification exam. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210246 - Energy II: Power Generation and Distribution

Grade Level: 10 - 12
Credits: 1
Description: Introduces students to methods of power production, power distribution, and physics principles that are associated with both. Addresses the competencies identified by the Center for Energy Workforce Development (CEWD) organization that are needed for energy industries. Combined with Energy I and Energy III qualifies students to take the CEWD Energy Industry Fundamentals (EIF) certification exam. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210247 - Energy III: Emerging Technologies in Energy

Grade Level: 11 - 12
Credits: 1
Description: Introduces students to emerging technologies and careers in the energy industry. It is the third of three modules that addresses the competencies identified by the Center for Energy Workforce Development (CEWD) organization that are needed for energy industries. Combined with Energy I and Energy II qualifies students to take the CEWD Energy Industry Fundamentals (EIF) certification exam. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210248 - Energy IV: Sustainability Management

Grade Level: 12 - 12
Credits: 2
Description: Examines the management of corporations as it relates to sustainability. Includes an overview of energy technology, energy resources, and emerging future energy technologies coupled with social and environmentally related legislation and its effect on corporations' triple bottom line (people, profit, and planet). Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210290 - Special Topics, Engineering

Grade Level: 9 - 12
Credits: 1
Description: This is a laboratory-based course design to study an engineering challenge, and/or recent technological advancements such as alternative energy, transportation, or other energy related fields. This study should include how this advancement affects society and/or environment. A culminating project integrating one or more of the contexts of the field of engineering is encouraged. It should include research, design, construction, analysis, writing, and presenting. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

Engineering and Technology - Career Major Electives (210300)

Courses not falling into one of the other career majors/sub codes

210330 - Engineering and Engineering Technology Co-op

Grade Level: 11 - 12
Credits: 1
Description: Cooperative education is a paid educational program consisting of in-school instruction combined with the program related on-the-job work experience in a business or industrial establishment. These are planned experiences supervised by the school and the employer to ensure that each phase contributes to the students Individual Learning Plan (ILP). Refer to the KDE Work Based Learning Manual for further specifications. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210331 - Engineering and Engineering Technology Internship

Grade Level: 11 - 12
Credits: 1
Description: Internship for CTE courses provides supervised work-site experience for high school students associated with their identified career pathway. Internship experiences consist of a combination of classroom instruction and field experiences. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

210341 - Foundations of Energy

Grade Level: 9 - 11
Credits: 1
Description: The course provides an overview of renewable and nonrenewable energy resources reflecting how energy impacts the environment and the economy from regional, state, national and global perspectives. Extensive hands-on laboratory activities are vital components of the curriculum. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Engineering
Population: General

Engineering and Technology - Engineering (Project Lead The Way)
(219900)

Career Major: Engineering is a four year sequence of courses which, when combined with traditional mathematics and science courses in high school, introduces students to the scope, rigor and discipline of engineering. Any course not found under this career major/sub code may be found in another career major/sub code with in this program area.

219901 - Introduction to Engineering Design (PLTW)

Grade Level: 9 - 12
Credits: 1
Description: Students dig deep into the engineering design process, applying math, science, and engineering standards to hands-on projects. They work both individually and in teams to design solutions to a variety of problems using 3-D modeling software, and use an engineering notebook to document their work. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219902 - Principles of Engineering (PLTW)

Grade Level: 10 - 12
Credits: 1
Description: Through problems that engage and challenge, students explore a broad range of engineering topics, including mechanisms, the strength of structures and materials, and automation. Students develop skills in problem solving, research, and design while learning strategies for design process documentation, collaboration, and presentation. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219903 - Digital Electronics (PLTW)

Grade Level: 10 - 12
Credits: 1
Description: From smartphones to appliances, digital circuits are all around us. This course provides a foundation for students who are interested in electrical engineering, electronics, or circuit design. Students study topics such as combinational and sequential logic and are exposed to circuit design tools used in industry, including logic gates, integrated circuits, and programmable logic devices. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219904 - Computer Integrated Manufacturing (PLTW)

Grade Level: 10 - 12
Credits: 1
Description: Manufactured items are part of everyday life, yet most students have not been introduced to the high-tech, innovative nature of modern manufacturing. This course illuminates the opportunities related to understanding manufacturing. At the same time, it teaches students about manufacturing processes, product design, robotics, and automation. Students can earn a virtual manufacturing badge recognized by the National Manufacturing Badge system. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219905 - Civil Engineering and Architecture (PLTW)

Grade Level: 10 - 12
Credits: 1
Description: Students learn important aspects of building and site design and development. They apply math, science, and standard engineering practices to design both residential and commercial projects and document their work using 3-D architectural design software. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219906 - Engineering Design and Development (Capstone) (PLTW)

Grade Level: 11 - 12
Credits: 1
Description: The knowledge and skills students acquire throughout PLTW Engineering come together in Engineering Design and Development as they identify an issue and then research, design, and test a solution, ultimately presenting their solution to a panel of engineers. Students apply the professional skills they have developed to document a design process to standards, completing Engineering Design and Development ready to take on any post-secondary program or career. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219907 - Aerospace Engineering (PLTW)

Grade Level: 10 - 12
Credits: 1
Description: This course propels students' learning in the fundamentals of atmospheric and space flight. As they explore the physics of flight, students bring the concepts to life by designing an airfoil, propulsion system, and rockets. They learn basic orbital mechanics using industry-standard software. They also explore robot systems through projects such as remotely operated vehicles. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219908 - Environmental Sustainability (PLTW)

Grade Level: 10 - 12
Credits: 1
Description: Students investigate and design solutions in response to real-world challenges related to clean and abundant drinking water, food supply, and renewable energy. Applying their knowledge through hands-on activities and simulations, students research and design potential solutions to these true-to-life challenges. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219909 - Design and Modeling (PLTW)

Grade Level: 6 - 8
Credits: n/a
Description: Students discover the design process and develop an understanding of the influence of creativity and innovation in their lives. They are then challenged and empowered to use and apply what they've learned throughout the unit to design a therapeutic toy for a child who has cerebral palsy. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219910 - Automation and Robotics (PLTW)

Grade Level: 6 - 8
Credits: n/a
Description: Students trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics® platform to design, build, and program real-world objects such as traffic lights, toll booths, and robotic arms. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219911 - Science and Technology (PLTW)

Grade Level: 6 - 8
Credits: n/a
Description: Science impacts the technology of yesterday, today, and the future. Students apply the concepts of physics, chemistry, and nanotechnology to STEM activities and projects, including making ice cream, cleaning up an oil spill, and discovering the properties of nano-materials. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219912 - Flight and Space (PLTW)

Grade Level: 6 - 8
Credits: n/a
Description: The exciting world of aerospace comes alive through Flight and Space. During this unit, students delve into the history of flight and space, discover the science behind aeronautics, and explore traveling and living in space. Students are then challenged to use their knowledge to design, build, and test an airfoil. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219913 - Magic of Electrons (PLTW)

Grade Level: 6 - 8
Credits: n/a
Description: Through hands-on projects, students explore electricity, the behavior and parts of atoms, and sensing devices. They learn knowledge and skills in basic circuitry design, and examine the impact of electricity on the world around them. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219914 - Energy and the Environment (PLTW)

Grade Level: 6 - 8
Credits: n/a
Description: Students are challenged to think big and toward the future as they explore sustainable solutions to our energy needs and investigate the impact of energy on our lives and the world. They design and model alternative energy sources and evaluate options for reducing energy consumption. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219915 - Green Architecture (PLTW)

Grade Level: 6 - 8
Credits: n/a
Description: Today’s students have grown up in an age of green choices. In this unit, students learn how to apply this concept to the fields of architecture and construction by exploring dimensioning, measuring, and architectural sustainability as they design affordable housing units using Autodesk’s® 3D architectural design software. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219916 - Medical Detectives (PLTW)

Grade Level: 6 - 8
Credits: n/a
Description: Students play the role of real-life medical detectives as they analyze genetic testing results to diagnose disease and study DNA evidence found at a crime scene. They solve medical mysteries through hands-on projects and labs, investigate how to measure and interpret vital signs, and learn how the systems of the human body work together to maintain health. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219918 - Introduction to Computer Science I (PLTW)

Grade Level: 6 - 8
Credits: n/a
Description: In this unit, students discover the principles of this fast-growing field by focusing on creativity and an iterative design process as they create their own basic apps using MIT App Inventor. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General

219919 - Introduction to Computer Science II (PLTW)

Grade Level: 6 - 8
Credits: n/a
Description: Students continue to explore the fundamentals of the stimulating career path of computer science. They venture into text-based programming through Python and, in the final problem, develop an app to crowdsource and analyze data on a topic of their interest. Participation in Kentucky Technology Student Association will greatly enhance instruction.
Content: Pre-Engineering
Population: General